

REMARKS

Applicants have amended the claims to more particularly define the invention taking into consideration the outstanding Official Action. Applicants most respectfully submit that all of the claims now present in the application are in full compliance with 35 USC 112 and are clearly patentable over the references of record.

Applicants note the rejection of claims 17-29 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention. The Examiner states that the language, "used as a data storage media" is confusing. The Examiner suggests that a substrate be added to the claim if this was intended. The Examiner's helpful suggestion is appreciated and the claims have been amended to clarify that the data storage media has a substrate and contains a recording layer containing a mixture of at least two dye complexes uniformly distributed throughout the recording layer as fully supported by Applicants' specification. In this regard, the Examiner's attention is most respectfully directed to Applicants' specification, especially the working example set forth on page 16. In experimental example 4, an applied example, it teaches that the new type of cyanine TCNQ complex dye (II) and cyanine dye (IV) were dissolved in 2,2,3,3-tetrafluoropropanol to form a 100 gram solution. The mixture of dye complexes were coated onto a blank substrate plate by a spin coater. Thus, it is clearly conveyed to one of ordinary skill in the art that the recording layer contains a mixture of the dye complexes, wherein the dye complexes are dissolve and therefore uniformly dispersed in the solution and the layered formed in accordance with the presently claimed invention. Note also the thickness of the layer of about 500 Å to about 2000 Å which has also been added as a claim limitation in a dependent claim. Further dependent claims have been added to specific aspects of the invention as fully supported by the specification and claims as originally filed. Applicants most respectfully submit that all of the claims now present in the application are in full compliance with 35 U.S.C. 112 and are clearly patentable over the references of record.

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The rejection of claims 17-29 under 35 U.S.C. 112, second paragraph, as being indefinite has been carefully considered but is most respectfully traversed in view of the amendments to the claims. The suggested substrate has been provided in the claims thereby obviating this aspect of the rejection. Claim 19 has been deleted and the specific formulas (II) and (IV) are now used in new claim 30. Claim 40 and the claims dependent thereon are broader than claim 30 and the claims dependent thereon in that a linear butyl is replaced with the broader expression alky. This broader aspect is fully supported by the specification as originally filed. It is most respectfully submitted that these formulas are fully supported by the specification, are not indefinite and therefore this aspect of the rejection has been obviated and should be withdrawn.

The rejection of claims 17-20 and 24-29 under 35 U.S.C. 103 as being unpatentable over Liao et al. '087 combined with Morishima et al. has been carefully considered but is most respectfully traversed in view of the amendment to the claims. As now amended, the claims require that at least one of the dye complexes in the recording layer contain a cyanine dye complex which is asymmetrical in having different substituents on the ring nitrogen atom. This is complex (II) which contains a linear butyl group. This aspect of the claimed invention is in no way suggested by the combination of references in this rejection. It is a claim limitation which cannot be withdrawn. Liao et al is limited to symmetrical substituents and no specific dye is identified in Morishima et al. Accordingly, for these reasons alone, the rejection should be withdrawn.

In this regard, Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

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The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicants also most respectfully direct the Examiner's attention to MPEP § 2144.08 (page 2100-114) wherein it is stated that Office personnel should consider all rebuttal argument and evidence present by applicant and the citation of In re Soni for error in not considering evidence presented in the specification.

The statement on page 4 of the Official Action that as the difference between the cyanine dye claimed and that of Liao et al. is the use of the TCNQ anion as the counter ion, and this is taught by Morishima et al. is specifically traversed since the claims as now amended contain asymmetrical dyes and those of Liao et al. contain symmetrical dyes. That is, they have the same substituent on the nitrogen atom which is not true for one of the dyes in the recording layer mixture as now claimed in the present application. This is a claim limitation which cannot be ignored.

As noted in the previous response, Applicants wish to again point out that the Morishima reference fails to teach, suggest or disclose every feature of the claimed invention. More specifically, Morishima et al failed to teach, suggest or disclose a cyanine dye-TCNQ complex as a data storage media, in accordance with the claim limitations of the present claims. Instead, Morishima teaches a dye layer doped with TCNQ. This is not the same as presently claimed and is not suggested by the prior art. As noted, the claims have been amended to more particularly define this aspect of the invention.

Applicants wish to point out secondly, that one of ordinary skill in the art may recognize that through doping of the cyanine dye with TCNQ, there could be improvement in photostability. However, because TCNQ is not soluble in common organic solvents and therefore the distribution of the doped TCNQ within the layer of the dye cannot be uniform in accordance with the presently claimed invention. In other words, the quality of the dye layer doped with TCNQ in accordance with the prior art cannot possibly produce a consistent and good quality recording layer in accordance with the presently claimed invention.

As previously noted, Applicants carried out several experiments and developed a new type of cyanine dye-TCNQ complex which has excellent solubility in common organic solvents so that a recording layer having both increased photostability and excellent quality can be produced in accordance with the presently claimed invention. In other words, because cyanine dye-TCNQ complex formation can eliminate the non-uniformity and the distribution of TCNQ molecules within the layer of dye when the TCNQ is doped into the layer of the dye in accordance with the prior art. Further, because the cyanine dye-TCNQ complex of the present invention is soluble in common solvents, therefore the recording layer can be formed using, for example, a simple spin coating method and thus the cost of the fabrication can be further reduced. This technique is shown in the exemplification of the present application.

In the Official Action, on page 4, it is urged that Liao et al. '087 teach the use of mixtures of pentamethine and trimethine indolene dyes which have 4-methoxycarbonyl benzyl moieties bound to the nitrogen on the indole ring.

In the Official Action, it is urged that Morishima et al. describes the addition of TCNQ to indoleineic cyanine dyes and that these do not need quenchers. However, Applicants most respectfully submit that Morishima et al. does not suggest the compositions of the presently claimed invention which are complexes and not simply doped layers. Morishima et al. describes in item 3, Results and Discussion, that in search of light-fast dyes, we compared photofading rates of dye layers prepared by spin-coating of representative dicarbocyanines to find a linear correlation with reduction

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potential ($E_{1/2}^{RED}$) of cyanine dyes as shown in Figure 1. The positive slope suggested that the photofading was of a reductive nature. This observation prompted the authors to study photofading of cyanine dye layers **doped** with oxidative or electron accepting compounds in expectation in that the electron accepting compounds prevent the reduction of the cyanine dyes so as to improve the light fastness of the cyanine dye layers. This doping is in contradistinction to the method of the present invention for preparing the compositions which require the intimate mixing to form the complex as presently claimed. In order to arrive at the presently claimed invention, one must select from all the dyes, the specific dyes shown by Liao et al. and then not to follow the instructions of Morishima in doping these compositions but instead, preparing a complex composition as presently claimed. This complex composition as claimed, possesses a unique combination of properties and provides superior results to that in the prior art. There is no motivation to make the necessary selection absent Applicants' specification which may not be used as a teaching reference.

Specifically, the Official Action fails to appreciate that one of ordinary skill in the art must make the selection of the initial cyanine dye from the prior art to be used in combination as presently claimed. Such a selection is only found in Applicants' disclosure which may not be used as a teaching reference. In re Fritch, 23 USPQ 1780, 1784(Fed Cir. 1992) ("It is impermissible to engage in hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps.") In addition, Applicants wish to note the background of inventor Liao. The inventor, Wen-Yih Liao who is a leader in the department of the data storage media technology, had worked in Industrial Technology Research Institute for 23 years and describes the conditions for experiments conducted and which it is believed establishes the patentability of the claimed invention as requested by the Examiner.

Condition for technology in the invention

1. The equipments are conventional.

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2. The use of temperature as reference to experimentals at page 10~18 of description.

3. How to progress as following

mixing a cyanine-TCNQ dye and an appropriate solvent as a TFP applied on a disk with a weight percent of 1.5%~2.2% under the basis of solute/solution and then;

coating rotationally a mixture of the cyanine-TCNQ dye and the TFP on an unused plastic film by the use of an optical measurement system as ETA-RT (STEAG) to measure a wavelength on a plurality of refractive index as $n+ik$, wherein said the process respectably relates to a absorption of the dye

4. Relative to experimental data between prior art and the invention

Providing a comparison between prior art (Morishima et al.) and the invention following the sheet; and where k is an absorption coefficient:

TERM	$n+ik$ (658nm) of Dye-X (Prior Art)	$n+ik$ (658nm) of Dye-TCNQ (Invention)
L-type Cyanine	$2.383+0.047 i$ (S0363-CIO4)->benefit	$2.150+0.098 i$ (L-E03-TCNQ)->benefit
SL-type Cyanine	$2.104+0.015 i$ (SL-PF6)->benefit	$2.090+0.045 i$ (SL-TCNQ)->benefit
S-type Cyanine	$2.210+0.015 i$ (S-PF6)->benefit	$1.980+0.040 i$ (S-E03-TCNQ)->benefit

As a conclusion, with respect to said the data combinations, a higher solubility of the invention with Cyanine dye-TCNQ complex is better then the Morishima's, which the solubility of the invention is 32 wt% and the solubility of the Morishima isn't higher 0.5 wt% and, could be equal to 0.5 wt%.

Note: Reference to experimental examples at page 10~18, of description, which had been stated the details.

The rejection of claims 17-29 under 35 U.S.C. 103(a) as being unpatentable over Liao et al. '087 combined with Morishima et al. and further in view of Sato et al. '839 has been carefully considered but is most respectfully traversed for the reasons discussed above with respect to the primary references.

Applicants acknowledge that Sato et al. '839 teaches that unsymmetrical indoleneic cyanine dyes having higher solubility and stability. Applicants most

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respectfully submit that it is only a result of hindsight based upon Applicants' specification that one would be motivated to combine the references as suggested in the Official Action. The '087 patent is explicit in its teaching of specific and identical R groups attached to the nitrogen atoms in the rings. There is no motivation to one of ordinary skill in the art to make this change and arrive at the presently claimed invention in view of a fair reading of the references by the skilled artisan. The Sato et al. reference teaches that these pendant groups must be different while the Liao et al. reference teaches that they must be the same. These are contradictory teachings. Clearly, the only motivation to make them different is provided by Applicants' specification and this is impermissible hindsight. This is especially true in view of the further claimed limitation with respect to the relative amounts of the dye complexes set forth in the claims and not taught in the prior art. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

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